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THE WATER EQUIVALENT OF SNOW ON GROUND.

By CHARLES A. MIXER, Civil Engineer, Rumford Falls, Me.

In a letter of March 7, 1903, to Dr. H. C. Frankenfield, in charge of the River and Flood Service, Mr. Charles A. Mixer, resident engineer of the Rumford Falls Power Company, at Rumford Falls, Me., on the Androscoggin River, communicates the following interesting observations:

"My usual gaging of the snow on the ground consists in simply getting a correct and full sample of the snow on the ground and then melting it to get the water equivalent. The sample is secured by forcing a cylinder down to the ground, then shoveling down around it and inserting a sheet metal bottom and lifting it out. On my voluntary observer's report for March, 1900, there is given my first report of such measurements. On account of the unusual depth of snow on the ground at a late date and its peculiar condition, I was led to make some measurements that season: these were on March 17, depth of snow, 38 inches; water equivalent, 10.49 inches; on the 31st the snow had settled to 20 inches, and the water equivalent was 9.84 inches. This represents ordinarily about 100 inches of winter snowfall, and is practically the whole winter's precipitation, to be added, when it runs off, to the greater spring precipitation. Think of this depth of water covering the surface waiting to be released, and imagine what would happen if all of it should run at once into the little river channels! This must have an important bearing on flood warnings. By gaging the snow, one can know in advance what may be expected, modified of course by considerations as to whether the snow melts and evaporates in the sunshine only or melts with the added help of a warm rain. I have kept up the measurements since my first observation in 1900, especially at the end of winter when the snow begins to go off.

"Another thought that led me first to such observations was my need of a sufficient explanation for certain monthly records of run off amounting to from 200 per cent to 500 per cent of the monthly precipitation. Of course this applies only to northern rivers, but the higher the altitude and latitude the more it means. At my present station, this season, the snow on the ground in an open place where my gage stands, measured on the 28th of February, 1903, only 19 inches, and gave 6.29 inches of water, but above us in the woods the snow is reported to be 4 to 6 feet deep. In connection with some of the northern rivers, this water that is held back, being stored in congealed form and waiting to go down, should be taken into consideration in order to get some advanced information."

RIVER FLOODS AND MELTING SNOW.

By CHARLES A. MIXER, Civil Engineer, Rumford Falls, Me., dated April 25, 1903.

The minimum discharge of the Androscoggin River occurs in February, and during the winter season the run off is controlled almost entirely by the temperature. The annual average run off is about 55 per cent of the annual precipitation, and varies monthly between 200 and 400 per cent of the total monthly precipitation. While trying to explain to myself the large run off in the springtime of from 2 to 4 times the monthly precipitation, I was led to consider the heavy covering of snow and noted it as an accumulated precipitation held in cold storage, to be released by warm weather; sometimes its release is accelerated, and its volume is increased by warm rains. In March, 1900, the depth of snow on the ground was more than the average, and being very heavy I thought to determine its water equivalent. I obtained a sample by pressing a cylinder down to the ground, digging around the outside, inserting a bottom of sheet metal and lifting out the sample. The result was entered on my monthly report as a voluntary observer, viz, March 17, snow on the ground, 38 inches; water equivalent, 10.49 inches. By the 31st the sun had settled the snow nearly one-half, and it was much heavier; the measurement gave 20 inches of snow and the equivalent water, 9.84 inches. I have made more such gagings since then, but not regularly. I have not usually made them systematically, but only at what seemed to be the end of the winter season. I have described the method to a number of others, but have never found one who had heard of it or tried it. Of course, in some parts of the country, men have no opportunity to see a large accumulation of snow or the remainder of three